II. "On the Chemical and Mineralogical Composition of the Dhurmsalla Meteoric Stone." By the Rev. SAMUEL HAUGHTON, M.D., F.R.S., Fellow of Trinity College, Dublin. Received June 6, 1866.

On the 14th July 1860, at 2.15 P.M., a remarkable meteoric stone fell at Dhurmsalla, in the Punjab; a small specimen of which was forwarded to the Geological Museum of Trinity College, which I have analyzed with the results contained in the following paper.

The direction of the motion of the meteorite was ascertained to be from N.N.W. to S.S.E.

The cold of the fragments that fell was so intense as to benumb the hands of the coolies who picked them up but who were obliged, in consequence of their coldness, instantly to drop them.

The specific gravity of the Trinity College specimen was found as follows:—

Weight in air	3335·4 grs.
Weight in water	2354·1 ,,
Sp. gr.	= 3·399.

The stone is grey, close-grained, and splintery in fracture, and presents fewer specks of metallic iron and magnetic pyrites than usual, and was coated with the ordinary black pellicle on its outer side.

From 100 grs. acted on with iodine, which dissolved the alloy of iron and nickel, there were obtained, of peroxide of iron 9·85 grs., and of protoxide of nickel 1·96 gr.

The portion insoluble in iodine was next acted on by dilute muriatic acid and evaporated to dryness at 212°, then moistened with muriatic acid and filtered, by which process it was divided into a soluble and insoluble portion; the portion left on the filter was boiled with carbonate of soda, so as to dissolve the free silica, which was found to be 18·95 grs. This was added to the portion originally soluble in muriatic acid, so as to give the following results:—

	grs.	
Silica	18·95	
Alumina	0·14	
Peroxide of iron	14·11	Present originally as protoxide and protosulphuret of iron.
Carbonate of lime	none	
Pyrophosphate of magnesia	51·31	
Potash and soda chlorides	0·30	
Platino-chloride of potassium	0·20	
Oxide of manganese ($Mn_3 O_4$)	0·66	

On treating another 100 grs. of the meteorite for sulphur, by boiling in

muriatic acid, and conducting the sulphuretted hydrogen into an ammoniacal solution of sulphate of copper, so as to form a black precipitate of sulphuret of copper, there were found by the usual methods 14·8 grs. of sulphate of barytes.

There were left, after treatment with iodine, muriatic acid, and carbonate of soda, 38·3 grs. of the 100 grs. originally acted upon.

From the foregoing facts, we readily obtain—from treatment with iodine and for sulphur—

	grs.		grs.
Peroxide of iron	9·85	....	6·88 iron
Protoxide of nickel	1·96	....	1·54 nickel
Sulphate of barytes	14·80	....	5·61 protosulphuret of iron.

Hence we find, as the primary analysis of the meteorite—

I. *Primary Analysis.*

1. Metallic iron	6·88
2. Metallic nickel	1·54
3. Magnetic pyrites	5·61
4. Earthy mineral (soluble)	47·67
5. Earthy mineral (insoluble)	38·30
	100·00

The results of the analysis of the soluble portion (considering that 5·61 of Fe S is equivalent to 5·10 of Fe_2O_3) give the following:—

II. *Earthy Mineral (soluble).*

	grs.		per cent.		Oxygen.
1. Silica	18·95	....	39·75	....	20·637
2. Alumina	0·14	....	0·29	....	0·135
3. Protoxide of iron	8·10	....	16·99	....	3·768
4. Protoxide of manganese	0·66	....	1·38	....	0·308
5. Lime	none	....	——	....	——
6. Magnesia	18·34	....	38·47	....	15·374
7. Potash	0·04	....	0·10	....	0·016
8. Soda	0·13	....	0·28	....	0·071
9. Loss	1·31	....	2·74	....	——
	47·67		100·00		40·309

Adding together the oxygen of the protoxides, we find—

RO	19·537	
SiO_3	20·637	20·772
Al_2O_3	0·135	

From the preceding result, it is evident that the soluble mineral in this

meteorite is chrysolith, or the silicate of magnesia and iron represented by the formula

$$3\,RO, \qquad Si\,O_3;$$

in which magnesia preponderates greatly over the iron.

The 38·3 grs. of mineral, insoluble in muriatic acid and in carbonate of soda, were now divided into two equal portions, of which one was fluxed with carbonates of soda and potash, and the other with lime and chloride of ammonium—with the following results :—

	grs.
Silica	10·85
Alumina	0·23
Peroxide of iron	2·51
Oxide of manganese ($Mn_3\,O$)	0·30
Oxide of chrome ($Cr_2\,O_3$)	1·42
Carbonate of lime	none
Pyrophosphate of magnesia	11·50
Potash and soda chlorides	0·30
Platino-chloride of potassium	0·50

Assuming the chrome to be present as chrome-iron,

$$Fe\,O,\ Cr_2\,O_3,$$

we find

	grs.
Original weight	19·15
Chrome-iron	2·08
Earthy insoluble	17·07

If we now omit the chrome-iron and make the necessary reductions in the foregoing results, we obtain—

III. *Earthy Mineral* (*insoluble.*)

	grs.	per cent.	Oxygen.
Silica	10·85	63·56	33·000
Alumina	0·23	1·34	0·525
Protoxide of iron	1·60	9·37	2·078
Protoxide of manganese	0·30	1·75	0·392
Lime	none	——	——
Magnesia	4·13	24·19	9·666
Soda	0·08	0·47	0·119
Potash	0·09	0·52	0·087
[Gain]	[0·21]	[1·20]	——
	17·07	100·00	45·867

The oxygen of the protoxides of the preceding analysis amounts to 12·342 per cent., but it would be fallacious to form any opinion as to the composition of the whole, so long as we are not acquainted with the constituent minerals that compose it.

Collecting together into one view the preceding results, we find—

IV. *Mineralogical Composition of the Dhurmsalla Meteorite.*

1. Nickel-iron	8·42	Iron..	6·88
		Nickel	1·54
2. Protosulphuret of iron	5·61		
3. Chrome-iron*	4·16		
4. Chrysolith (*peridot* or *olivine*)	47·67		
5. Minerals insoluble in muriatic acid	34·14		
	100·00		

I shall here add, for the purpose of comparison, the results of my analysis of the meteoric stone that fell at Dundrum, co. Tipperary, at 7 P.M. of the 12th August, 1865.

Dundrum Meteorite.

Sp. gr. ..... 3·066 to 3·570.

I. *Mineralogical Composition.*

1. Nickel-iron	20·60	Iron ..	19·57
		Nickel	1·03
2. Sulphur-iron	4·05		
3. Chrome-iron	1·50		
4. Chrysolith	33·08		
5. Earthy minerals insoluble in muriatic acid	40·77		
	100·00		

II. *Chemical Composition of the Chrysolith.*

Silica	38·74		38·86
Alumina	0·45		——
Protoxide of iron	16·55		19·74
Protoxide of manganese	0·15		——
Lime	0·84		0·72
Magnesia	40·93		36·85
Potash	0·51		0·47
Soda	0·24		0·22
Loss	1·59		3·14
	100·00		100·00

* The quantity of chrome found in this meteorite is unusually large, being represented by 2·84 per cent. of Cr_2O_3, and by 4·16 per cent. of FeO, Cr_2O_3; yet it is not without precedent, for in the meteoric stone that fell at Nobleborough, Maine, U. S. A. on the 7th of August, 1823, Webster found 4 per cent. of Cr_2O_3.

III. *Chemical Composition of the Earthy insoluble Minerals.*

Silica	61·33
Alumina	1·72
Protoxide of iron	6·06
Protoxide of manganese	0·78
Lime	3·99
Magnesia	22·02
Soda	1·38
Potash	0·83
Loss	1·89
	100·00

III. "On the Preparation of Ethylamine." By J. Alfred Wanklyn, and Ernest T. Chapman. Communicated by Dr. Frankland. Received June 8, 1866.

Having recently had occasion to prepare a considerable quantity of ethylamine, we have made the observation that this base may be obtained with much greater facility than is usually believed.

We digested together equal volumes of iodide of ethyl, strong alcohol, and aqueous ammonia. The digestion was carried on at a very moderate temperature, certainly not exceeding 80°, but the tubes were constantly agitated. In this manner the reaction is completed in about half an hour. The mixed iodides thus obtained were evaporated to expel excess of ammonia, introduced into a retort; enough potash was added to neutralize $\frac{1}{10}$ of the iodine present, and the mixture was distilled into dilute hydrochloric acid. The receiver was then changed, the same quantity of potash again added, and the products collected as before. Then six times as much potash was added, and the products collected. The remaining two-tenths of the potash were added separately.

Portions of each of these fractions were converted into platinum salts, and the amount of platinum was determined by ignition. Each of the first four fractions corresponding to $\frac{9}{10}$ of the total bases obtained, gave more platinum than corresponds even to pure ethylamine, and therefore contained ethylamine and ammonia. Only the last fraction, corresponding to $\frac{1}{10}$ of the entire bases, gave a lower percentage of platinum than corresponds to ethylamine, and therefore contained the di- and tri-bases.

Subjoined are the platinum determinations in this last fraction:—

I. 0·2133 grm. gave 0·0830 Platinum
II. 0·3590 „ „ 0·1382 „

or,

I. Platinum per cent. 38·91
II. „ „ „ 38·59

$Pt Cl_2 N C_2 H_5 H_3 Cl$ contains 39·37 per cent. of Pt.
$Pt Cl_2 N (C_2 H_5)_2 H_2 Cl$ contains 35·42 „ „